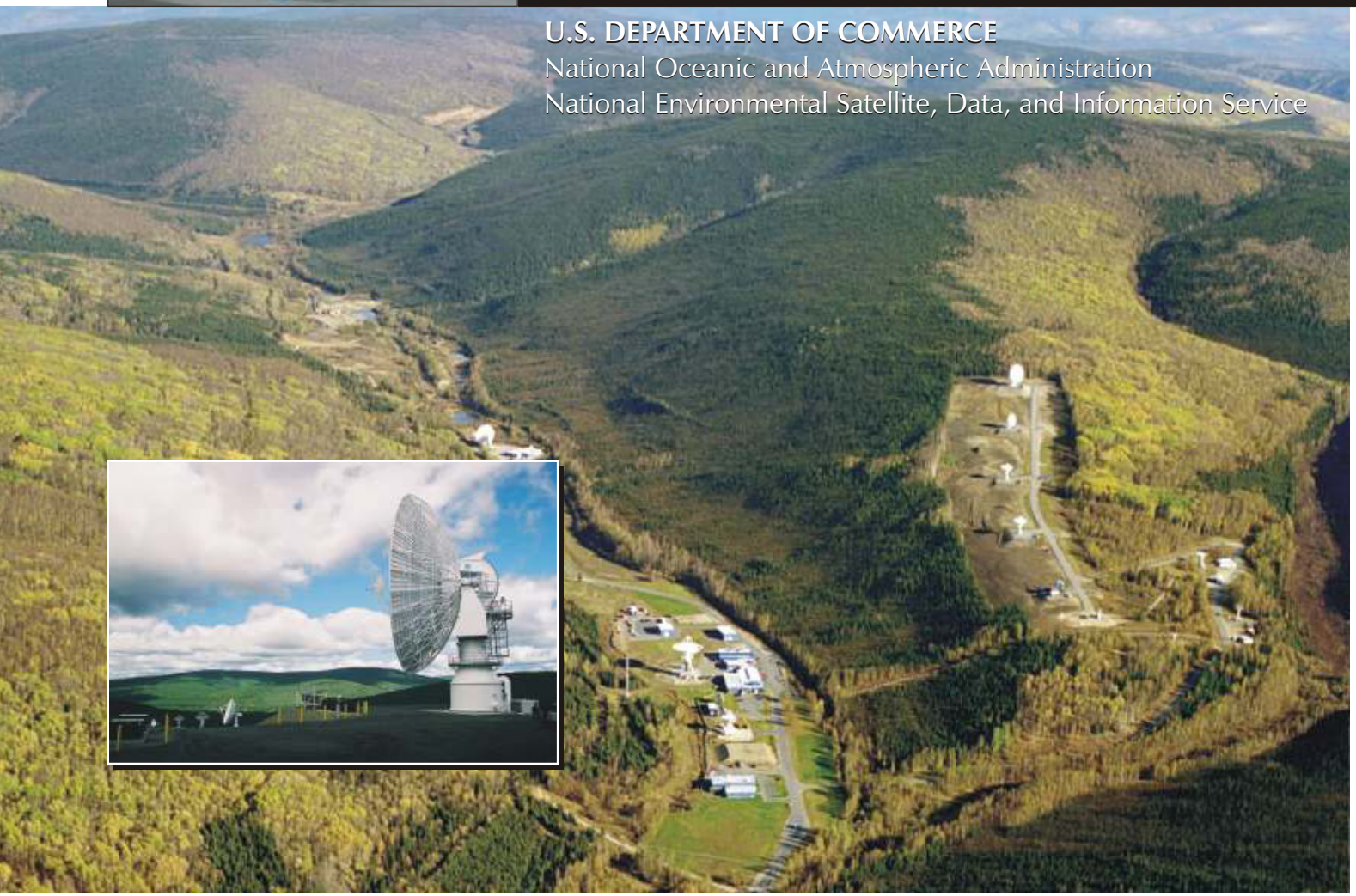
Facilities Master Plan

Executive Summary

Fairbanks Command and Data Acquisition Station, Alaska



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service

FINAL

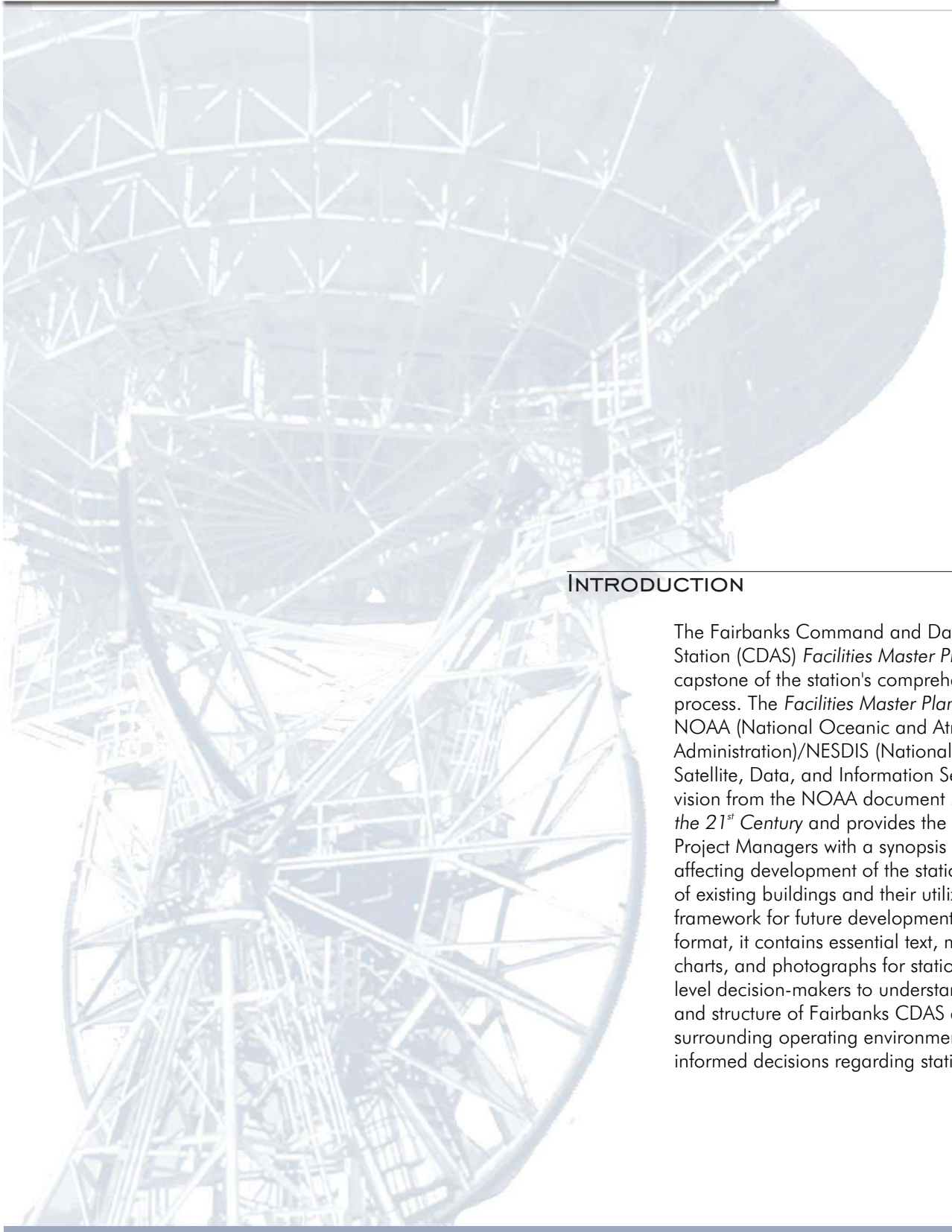
Fairbanks CDAS

Facilities Master Plan

Executive Summary

July 2004

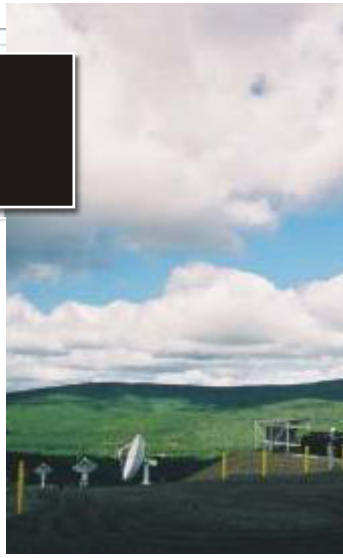
Fairbanks CDAS Facilities Master Plan



Introduction

The Fairbanks Command and Data Acquisition Station (CDAS) *Facilities Master Plan (FMP)* is the capstone of the station's comprehensive planning process. The *Facilities Master Plan* incorporates the NOAA (National Oceanic and Atmospheric Administration)/NESDIS (National Environmental Satellite, Data, and Information Service) strategic vision from the NOAA document *New Priorities for the 21st Century* and provides the Station and Project Managers with a synopsis of the factors affecting development of the station, an assessment of existing buildings and their utilization, and a framework for future development. Concise in format, it contains essential text, maps, graphics, charts, and photographs for station and higher level decision-makers to understand the character and structure of Fairbanks CDAS and the surrounding operating environment and to make informed decisions regarding station development.

Fairbanks CDAS



NOAA/NESDIS Strategic Vision

To move NOAA into the 21st Century scientifically and operationally, in the same interrelated manner as the environment that we observe and forecast, while recognizing the link between the global economy and the planet's environment.

Fairbanks CDAS Mission

The station's primary purpose is to provide operations support (uplink/downlink) of the NOAA polar-orbiting, meteorological spacecraft and other assigned satellite support missions, and to distribute the spacecraft-derived environmental products to a worldwide population of users. The Fairbanks CDAS provides the means to command, control, and readout for polar-orbiting satellites; furnishing the Nation and the State of Alaska with vital information regarding meteorology, search and rescue, oceanography, ice edge analysis, general aviation, vulcanology, and forest fire detection. Additionally, the station is an international cooperative scientific preserve contributing to national and international interests.

On-going current missions include:

- Polar-orbiting Operational Environmental Satellite Program (POES),
- Geostationary Operational Environmental Satellite Program (GOES),
- Defense Meteorological Satellite Program (DMSP),
- Very Long Baseline Interferometry (VLBI) Program,
- Search and Rescue Satellite Aided Tracking System (SARSAT), and
- The High Power Auroral Stimulation Observatory (HIPAS).

Future missions include:

- National Polar-orbiting Operational Environmental Satellite System (NPOESS),
- Meteorological Operations (METOP),
- Expanded NASA Earth Observing System (EOS),
- Program support for EOS Aqua and EOS Aura satellites, and
- Air Force OD-4 support.

The Fairbanks CDAS will continue to provide vital support for NOAA satellite operations.

Facilities Master Plan

FCDAS Development Vision

The development vision emphasizes a modern, robust physical plant employing state-of-the-art technology in support of the NOAA/NESDIS data acquisition mission. Future facilities and infrastructure-based capabilities shall accept new missions and organizations, while supporting quality of life objectives and an exceptional built environment. Station facilities are to be sized for future mission needs, optimized for functionality and efficiency, and designed to promote environmentally sustainable practices.

Facilities Master Plan Goals and Objectives

Comprehensive planning begins with management's vision defining future directions and priorities for the Fairbanks CDAS over the next 20 to 25 years. The Facilities Master Plan (FMP) reinforces the strategic vision; directing future development to achieve NOAA/NESDIS goals and objectives. The FMP focuses on the near term when future missions and requirements are relatively well-defined; but also includes the long-range planning horizon, by providing relevant tools to manage changing missions, technologies, and baseline conditions. The overall goal is to ensure that Fairbanks CDAS facilities, infrastructure, and communications continue to support the vision of NOAA/NESDIS.

Goal:
Increase operational and functional efficiency.
Objectives:
- Maintain a radio quiet zone with minimal degradation to the electromagnetic environment.
- Cluster compatible and functionally related activities to increase efficiency.
- Maintain effective, cooperative working relationships with federal, state, and local government planning agencies.
- Preserve the operational integrity and security of the station's missions, facilities, infrastructure, and personnel.

Goal:
Maintain the long-term viability of the station.
Objectives:
- Conduct a periodic facility condition assessment to evaluate all buildings, structures, and utilities.
- Promote energy efficiency through facility sitings and infrastructure layout.
- Manage encroachment/public access to ensure compliance with physical security requirements and proper uninterrupted station operations.
- Continue modernization efforts outlined in the Fairbanks CDAS infrastructure initiative.
- Prepare facilities and infrastructure to support the METOP and NPOESS program satellites.

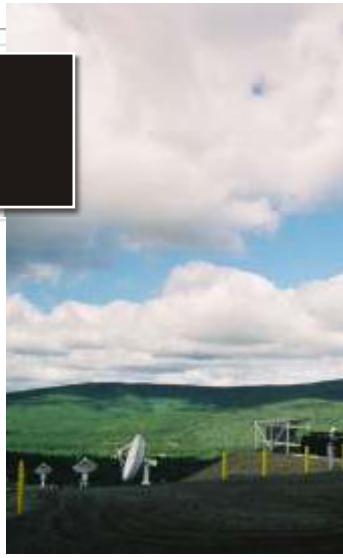
Goal:
Improve the quality of life for all station employees and visitors.
Objectives:
- Provide a safe working environment for all station activities and mitigate potential hazards.
- Preserve and enhance natural resources for environmental and aesthetic reasons.
- Provide adequate, close-in parking that protects personnel and vehicles from harsh winter extremes.
- Direct future facility expansion and new construction to maintain functional relationships.

Goal:
Capitalize on all available funding.
Objectives:
- Identify future development requirements as early as possible in order to insert them into the funding stream.
- Execute needed studies, assessments, etc. to mitigate potential problems before they become unmanageable.

Goal:
Promote the station as an attractive place for new missions.
Objectives:
- Examine ways to promote the passive use of forest, recreation, and mineral values without conflicting with station mission(s) and/or environmental regulations.
- Improve the station's appearance to provide an overall positive impression.
- Preserve and make optimum use of surrounding landscapes and views.

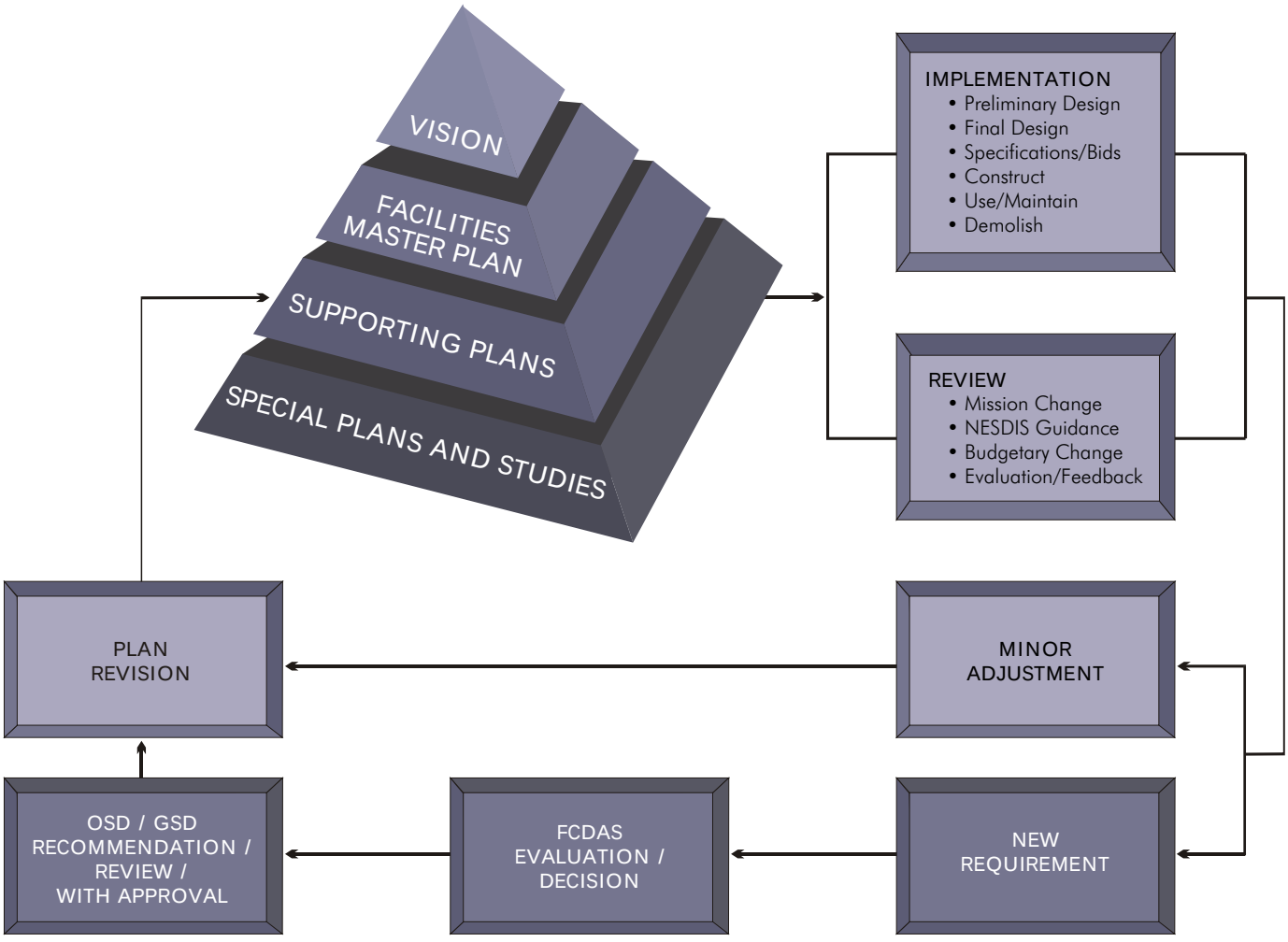
Goal:
Protect critical national security infrastructure.
Objectives:
- Enhance the security environment of the station.
- Purchase available land surrounding the station to preclude encroachment whenever possible.

Fairbanks CDAS



Facilities Master Plan Implementation, Maintenance, And Revision

The Facilities Master Plan is intended to be a "living document." As such, it will require maintenance and revision as the mission, budget, and other conditions generate new planning requirements. Implementation of the plan is also an on-going task. Several agencies and individuals have direct input and/or responsibility for these activities. The Fairbanks CDAS Station Manager has the most direct control; however, various other managers on the station provide input and guidance. Personnel from the Office of Satellite Operations (OSO)-Ground Systems Division (GSD), Office of Systems Development (OSD), NOAA, Integrated Program Office (IPO), and NASA also provide direct and indirect support for the plan through development of mission objectives, planning for new satellites and ground equipment, and in specifying, procuring, installing, testing, and accepting new systems, subsystems, and major modifications to existing facilities.



Facilities Master Plan

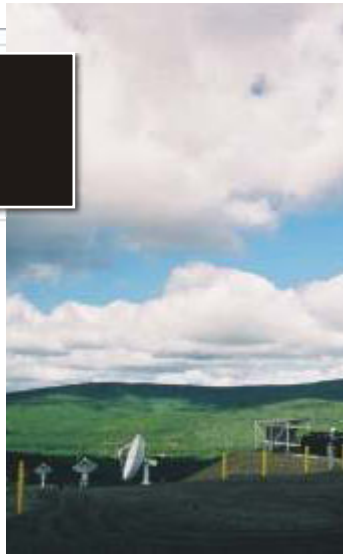
History

The Fairbanks CDAS is the farthest-north civilian operated satellite tracking station in U.S. territory. It was originally a NASA station operated under contract to the University of Alaska Geophysical Institute. NOAA and NASA shared use of the facility from 1973 until 1984, after which NASA relinquished control of the station and NOAA assumed total management of the facility. The first facilities constructed on the station in 1961 were an operations building (Operations Building) and a powerhouse. In 1963, the Gilmore Creek Geophysical Observatory (GCGO) was constructed to house NOAA operations. From 1964 to 1974, build-out at the Fairbanks CDAS was completed. The last major facility constructed was the Water Storage Building in 1974. Aside from several interior and exterior renovations and upgrades, consolidation and relocation of functions, and/or utility-related modifications, no new buildings have been constructed since 1974. Presently, NOAA continues to operate the station under contract with Space Mark International (SMI); although NASA maintains a presence on the site, occupying portions of the GCGO Building, in support of the Very Long Baseline Interferometry (VLBI) project.

Description

The Fairbanks CDAS is located in the Great Interior of Alaska within the Fairbanks North Star Borough (FNSB), some 13.5 miles northeast of Fairbanks, Alaska and just northeast of Fox, Alaska. Fairbanks is referred to as Alaska's "Golden Heart City." It is the second largest city in Alaska and the primary commercial and industrial center north of the Alaska Range. As the regional service and supply center for Interior Alaska, Fairbanks offers a diverse economy, including city, borough, state, and federal government services, transportation, communication, manufacturing, financial, and regional medical services. Tourism and mining are also a significant part of the economy. Substantial population growth is assumed to continue, with the total FNSB population forecast to rise to nearly 105,000 people by 2025.

Fairbanks CDAS



Constraints and Opportunities

Development opportunities at the Fairbanks CDAS are limited due to an extensive array of on-site and off-site constraints. Natural constraints such as steep topography, permafrost, soils, floodplains, wetlands pose severe physical constraints to development. Vicinity constraints outnumber opportunities and include mining rights, land use conflicts, and radio frequency interference. Infill development, within currently developed areas, will define the primary development opportunities to support future facilities development and mission support.

Fairbanks CDAS Constraints Summary

Constraint	Status	Comment
Vicinity		
Contextual Land Use		Adjacent mining operations and private land uses may conflict with operations.
Outleasing and Land Ownership		Patented lands and mining claims require active monitoring and management.
Encroachment		Encroachments pose security and operational issues.
Natural		
Climate and Weather		Fairbanks CDAS has a continental climate, with annual temperature extremes.
Wetlands		Gilmore and Rose Creeks support wetlands and black spruce woodlands.
Floodplains*		100-year floodplain and aufeis buildup adjacent to Gilmore Creek constrain development.
Geology		Ready Bullion Formation consists of wind-deposited silt (loess) and is generally undesireable for building.
Soils		Peat soils have poor drainage and overlie permafrost at a shallow depth.
Permafrost		Permafrost in Gilmore Creek Valley create major engineering problems if thawing occurs.
Vegetation and Forests		Black spruce and upland forest do not pose a major constraint to development.
Fish and Wildlife		Fish and wildlife resources do not pose a constraint to development.
Threatened and Endangered Species		No known threatened and endangered species on-site.
Cultural		
Historical and Archeological Sites**		Varying significance; future development should mitigate potential resources.
Outdoor Recreation Areas		No constraint to future development.
Environmental		
Solid Waste Disposal and Recycling Points		No significant constraint.
Hazardous Waste Generation		Site hazardous waste generators and collection points to avoid water sources.
Fuel Storage Tanks		Tank at Operations Building is too close to water well.
Air Emission Source Discharges		Should not pose significant constraint.
Drinking Water Supply Sources & Monitoring Points		All setbacks met, except for water well at Operations Building.
Wastewater Point Source Discharges		Maintain separation from water wells and vertical separation from water table.
Stormwater Non-point Source Discharges		National Pollution Discharge Elimination System (NPDES) General Permit and mitigation measures are required for new construction over five acres in extent.
Radon Emissions		Should not pose development constraints.
Pest Management		No current issues.
Operational		
Electromagnetic Radiation Safety Zones		Limited in extent.
Antenna Look Angles		Unlikely to constrain future development.
Security Clear Zones		Roads and parking areas do not meet setback requirements for force protection/anti-terrorism.
Audible/Urban Noise		No issues impacting future development.
Vibrations		Expansion of mining activities to Gilmore Dome could create impacts on operations.
Electromagnetic Interference		Removal of Gilmore Dome, expansion of mining activities, and vehicle ignition noise has potential to adversely impact operations.

Legend

- Major Constraint; development of Fairbanks CDAS prohibitive in affected areas.
- Minor Constraint; development permitted in affected area with considerations.
- Not a constraint to development.

* Current flood potential considered minor based on station containment efforts; however, should certain activities occur upstream, the flood potential could rise significantly.

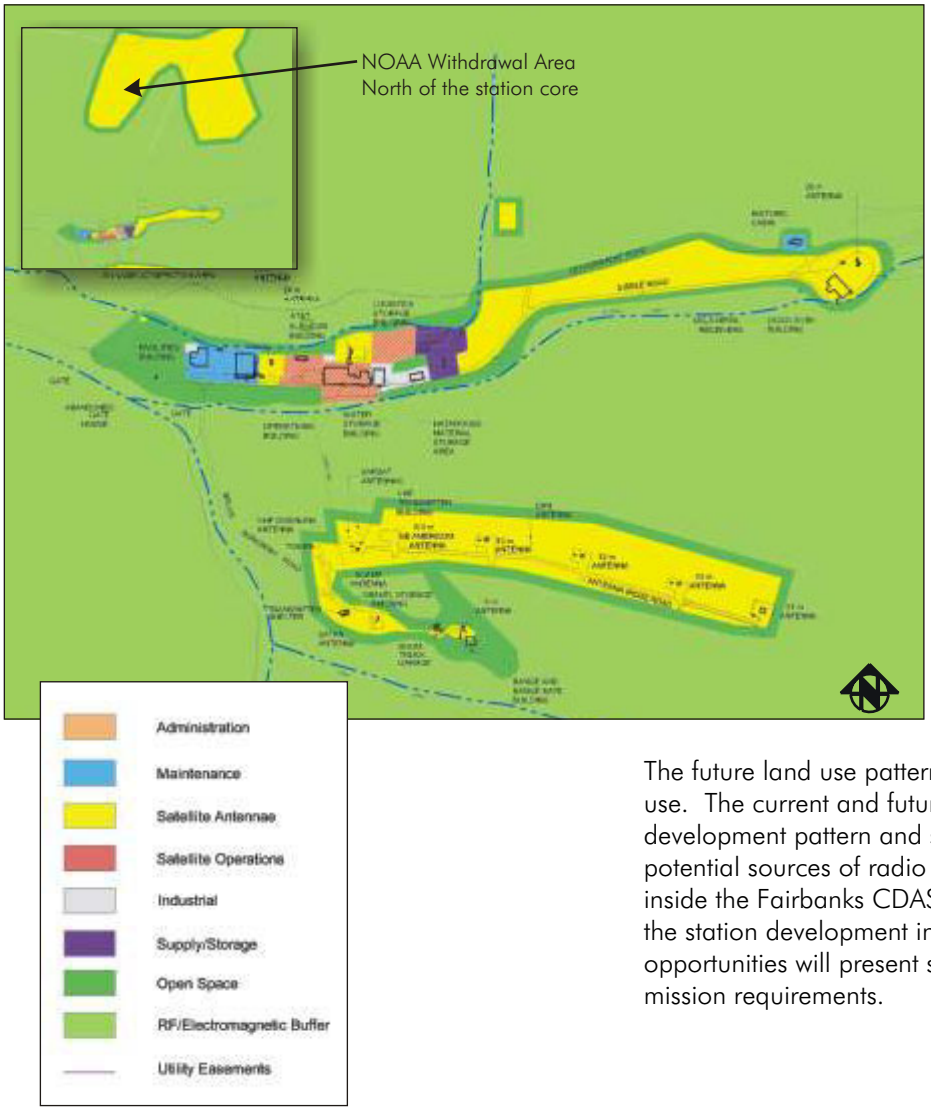
** High probability archeological sites considered major constraint, and medium probability archeological sites considered minor constraint.

Facilities Master Plan

Land Use

Fairbanks CDAS is located on an 8,500 acre Federal reservation within Fairbanks North Star Borough (FNSB), approximately 13.5 miles northeast of the City of Fairbanks and just northeast of Fox, Alaska. Areas adjacent to the station are sparsely developed, with scattered residential, commercial, and mining uses predominant. The majority of parcels adjacent to Fairbanks CDAS are owned by the Alaska Mental Health Trust Authority (MHTA) and are managed by the Alaska Department of Natural Resources (DNR) to provide public benefit, including annual sales to fund the MHTA programs. The DNR has published the Tanana Basin Area Plan (TBAP) to guide use of public and private lands. The TBAP outlines primary uses of settlement, residential and commercial development, north and east of the Fairbanks CDAS. These areas are designated by the draft FNSB Comprehensive Plan as High Mineral Potential, and supported with a policy to discourage public residential land disposals ultimately to encourage mining activities.

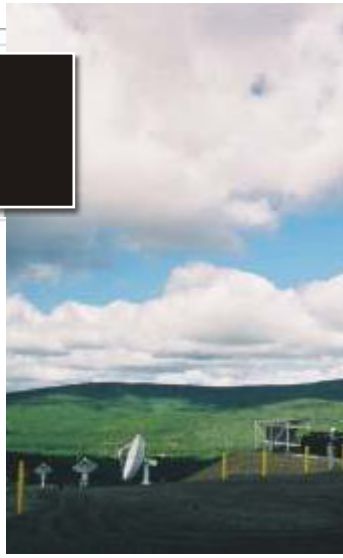
Future Land Use



Current land use within the Fairbanks CDAS is primarily dedicated to satellite operations, satellite antenna sites, and RF/Electromagnetic Buffers. The satellite operations building also includes logistics and utility operations support functions. The developed area within Fairbanks CDAS is located just east of the Steese Highway and the entry to the station. Administration, maintenance, satellite antenna sites, and logistics supply/storage uses are located adjacent to the operations building. The majority of the satellite antennas sites are located south of the developed station core, along a prominent ridgeline that provides excellent line-of-sight geometries for satellite communications.

The future land use pattern is relatively unchanged from the existing land use. The current and future land use provides a reasonably compact development pattern and separates sensitive satellite antennas from potential sources of radio frequency (RF)/electromagnetic interference inside the Fairbanks CDAS. Site constraints limit geographic expansion of the station development in an outward direction; however, numerous infill opportunities will present sufficient future flexibility to support future mission requirements.

Fairbanks CDAS



Transportation

The Fairbanks CDAS road network is very limited, consisting of Eisele Road and Bruce Domorski Road. Eisele Road connects the station core to the Steese Highway at the main entry gate. Bruce Domorski Road provides access to the satellite antenna sites south of the station core. Both Eisele and Bruce Domorski are two-lane paved roads that serve as the primary circulation spine at the station. A network of secondary paved and unpaved service roads supplements the two primary roads. Generally, the existing road network provides adequate capacity and access to facilities and antenna sites at the station.

In the future, attention should be paid to maintenance of force protection setbacks from roads and parking adjacent to facilities and satellite antennas and to provide alternate routes for delivery vehicle traffic. Improvement of road geometries and widths for Bruce Domorski Road and other service roads that provide access to the satellite antennas is needed. These roads must provide sufficient width to allow large antenna maintenance and delivery vehicles to access the antenna sites. Finally, the existing pavements must be upgraded to address flooding and physical deterioration.

Facilities Master Plan

Facility Assessment

The facility assessment, including general architectural, engineering, environmental, and safety aspects of Fairbanks CDAS facilities is shown in the table below:

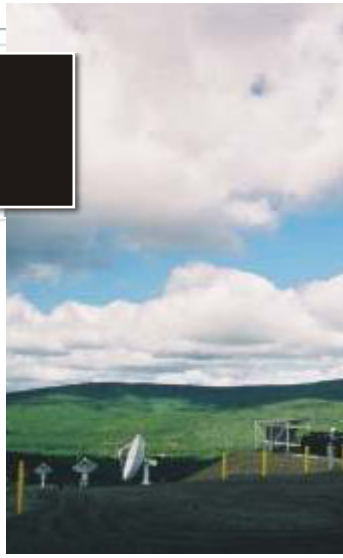
Facility Assessment Summary	
Assessment Area	**Status**
Fairbanks CDAS Infrastructure	
Storm Drainage System	
Water System	
Sanitary Sewer System	
Electrical Power System	
Communications System	
Fire Protection System	
Fuel Storage	
Individual Buildings	
Operations Building	
Facilities Building	
GCGO Building	
Range and Range Rate Building	
Water Storage Building	
Logistics Storage Building	
Transmitter Shelter	
Boom Truck Garage	
Threat Assessment	
Continuity of operations issues, parking lot and road setbacks.	

Legend

- Critical deficiencies
- Minor deficiencies
- No critical or minor deficiencies noted

In general, Fairbanks CDAS facilities do not meet modern standards and are generally beyond their economic lifespan. There are serious structural issues at the operations building in particular, as well as facility efficiency and building/infrastructure systems reliability issues.

Fairbanks CDAS

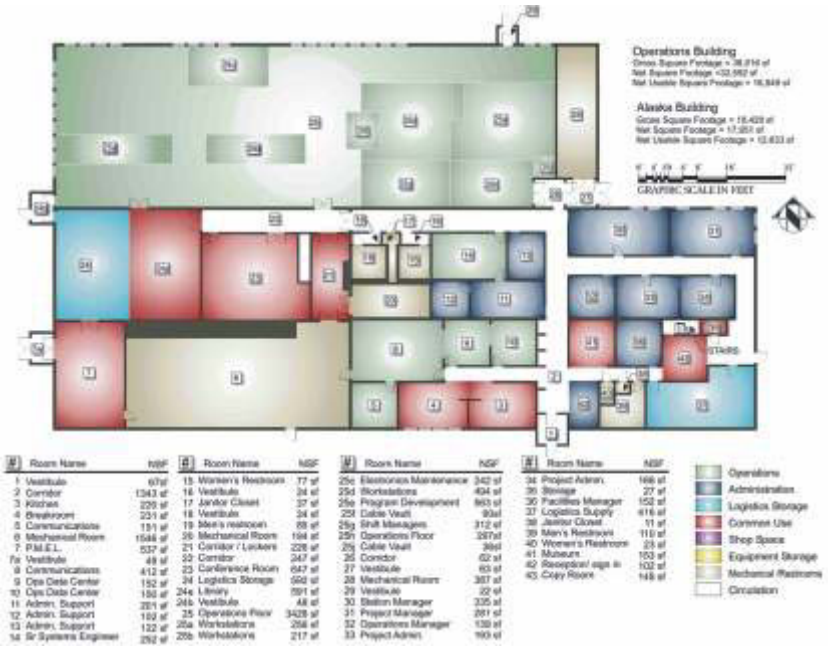


Facility Utilization

In conjunction with the Facility Condition Assessment detailed in Section 5D; existing documentation was reviewed and other data gathering activities were performed to obtain a clear understanding of the existing station layout and future development issues. The study included the following principal elements:

A field survey that identifies existing facilities within the Fairbanks CDAS, their assigned operations, and occupants.

- An evaluation of current and future mission activities and translation of activity needs into facility space requirements.
- A determination of the adequacy of the existing buildings to meet the operational requirements.
- Generation of a range of options to overcome any operational space deficiencies identified during the course of the study. Once the existing space utilization was assessed; the study generated future development alternatives and facility strategies to meet space requirements and offset space deficiencies.
- A range of alternative actions (i.e., modifications and/or new construction, use of off-station facilities at other locations, or some combination of both) is presented/recommended.



Fairbanks CDAS Requirements Summary

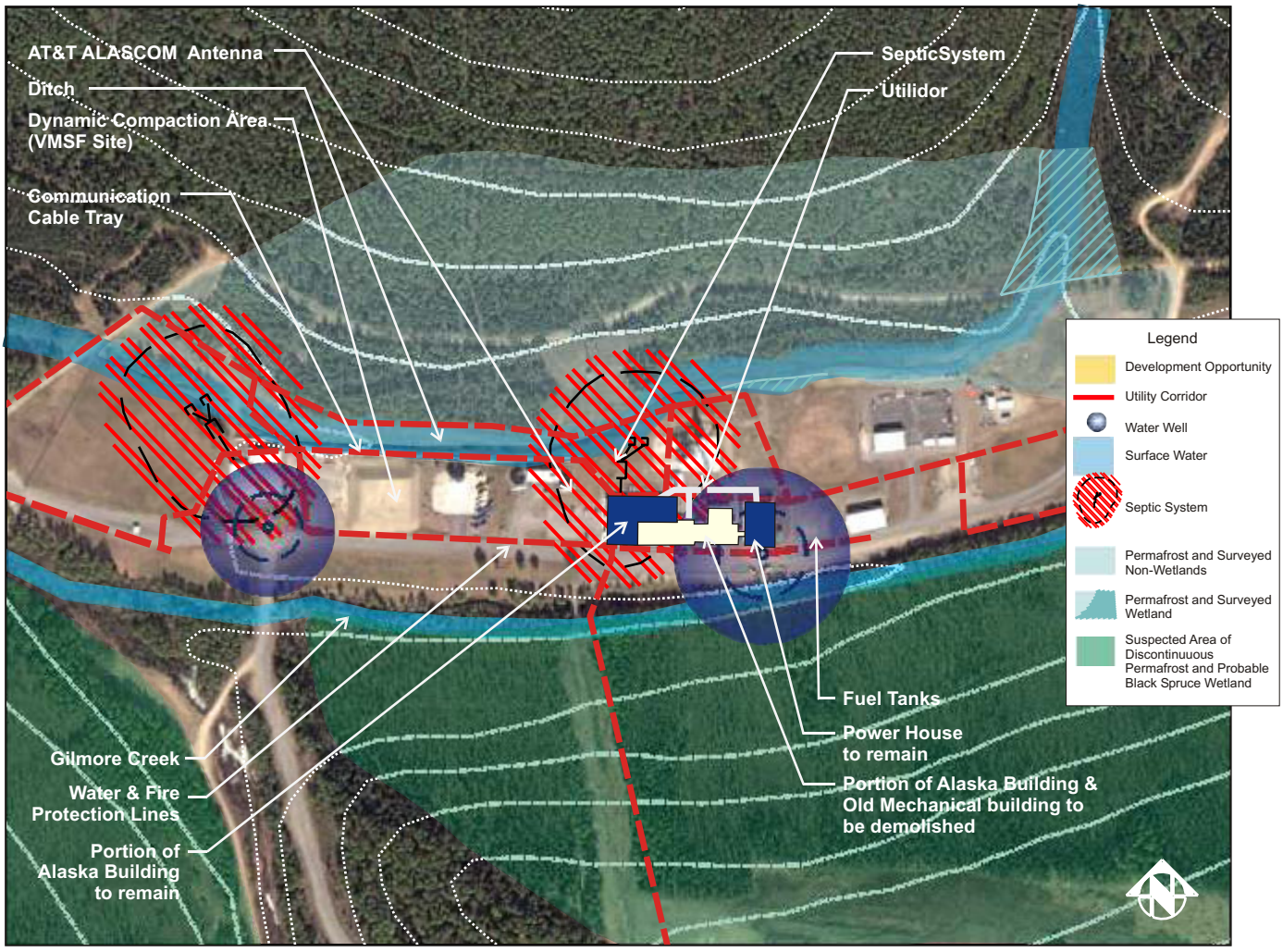
Functional Increment	Existing (E)-NUSF	Required (R)-NUSF	E-R=+ [Surplus]/ (-) [Deficit]	NTG	Total NTG including 'Alaska Factor'	Deficit or Surplus (GSF)
Administration	4,421	2,606	1,815	1.25	1.38	2,496
Mission Operations (Ops Bldg)	7,928	14,583	(6,655)	1.55	1.71	(11,347)
Mission Operations (VLBI)	6,861	0	6,861	1.55	1.71	11,698
Mission Operations (Transmitter)	747	0	747	1.31	1.44	1,076
Mission Operations (Range and Range Rate)	1,465	0	1,465	1.87	2.06	3,014
Logistics Supply Storage	6,360	7,602	(1,242)	1.15	1.27	(1,571)
Common Use Areas	2,770	3,807	(1,037)	1.25	1.38	(1,426)
Facility Maintenance	8,355	25,341	(16,986)	1.15	1.27	(21,487)
Special Storage (Water Storage)	3,991	3,991	0	1.04	1.14	0
Grand Total	42,898	57,930	(15,032)			(17,547)

DEVELOPMENT OPPORTUNITIES

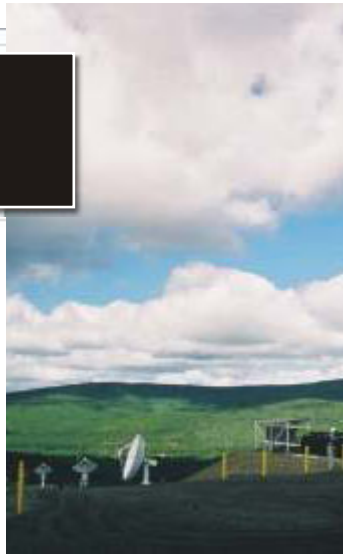
Development opportunities within the Fairbanks CDAS withdrawal area are limited. Developable sites for facilities and new antennas generally include:

- the Gilmore Creek Valley and the ridgeline adjacent to Bruce Domorski and Antenna Ridge Roads, and
- antenna development on remote ridgelines.

Remote sites may be considered, if the development can meet operational, electromagnetic/spectrum management, land use compatibility, and facility/infrastructure investment criteria. The FMP does not recommend significant expansion of the Fairbanks CDAS developed area at this time. Facility development will generally consist of limited infill new construction and facility revitalization activities. No new antennas are planned at this time.



Fairbanks CDAS



Major Recommendations

Strategic Planning. Optimize mission capabilities to support polar-orbiting satellite programs through systematic development of new high-latitude sites, identification of new antenna sites, and monitoring potential threats to continued operations.

Barrow CDAS. Extend operations to a high-latitude site in Barrow. Note: as of this writing, the Arctic Satellite Antenna Project (ASAP) at Barrow has been placed on hold.

Future Land Use. Expand mission-related land use districts and set aside development reserve areas within the station core. Reserve remote antenna sites.

Regional Planning. Participate in regional planning efforts that affect adjoining lands so as to protect, secure, and maintain station operations.

Encroachment. Manage encroachment to ensure compliance with physical security requirements and proper uninterrupted station operations.

Security Enhancements (Anti-Terrorism/Force Protection). Modify facilities and infrastructure to meet standoff criteria; implement current best practices in anti-terrorism/force protection planning.

New Facility Development. Construct replacement and expansion facilities to enhance mission capability, modernize the facility set, and improve space utilization.

Facilities Revitalization. Renovate and modernize core mission facilities to extend their usable lifespan, meet new mission requirements, maximize space utilization, and optimize building performance.

Facilities/Antenna Demolitions. Demolish obsolete structures and antennas.

Infrastructure. Execute utility infrastructure upgrades prior to facility development to provide capacity expansions, redundancy, and resilient system design.

Transportation. Reconfigure the road network and parking to set aside the station core for mission facilities and provide force protection standoffs.

Urban Design/Site Planning. Create a coherent high technology campus that reflects critical national security infrastructure mission.

Architectural Design Excellence. Create an architectural image reflective of critical national security and scientific missions. Implement a design theme through consistent forms, massing, scale, colors, and materials.

Landscape Design. Connect urban design and architectural elements with landscape, streetscape, and pedestrian amenities within an identifiable theme.

LEED (Leadership in Energy & Environmental Design). Ensure building designs, new and retrofitted, incorporate LEED measures to achieve a high level of energy conservation and sustainability.

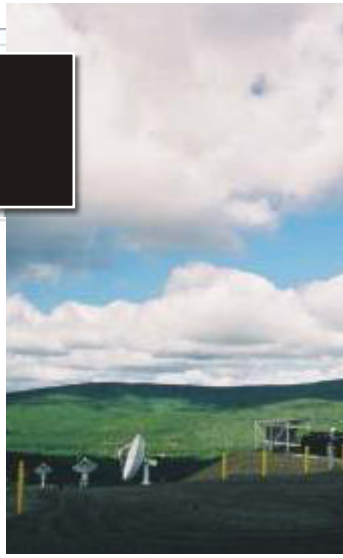
Facilities Master Plan

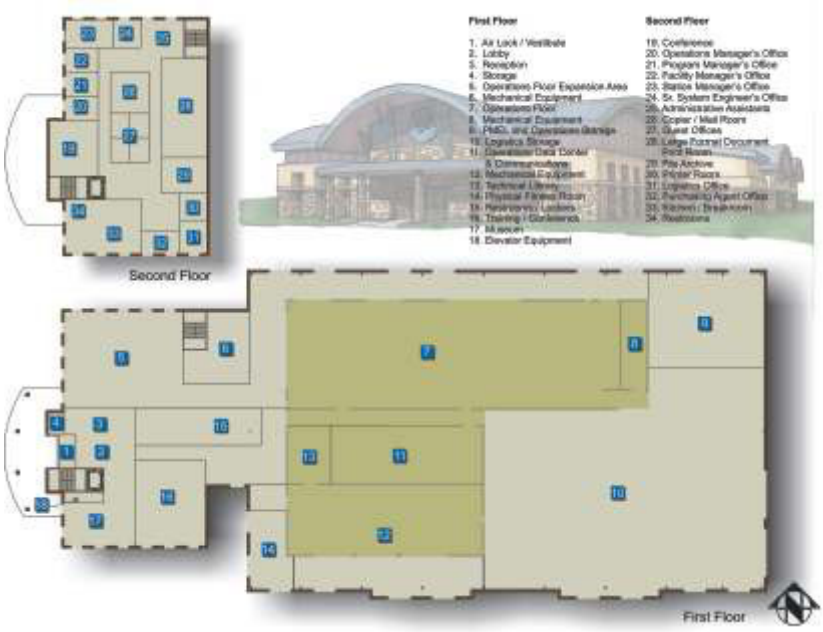
Capital Improvements Phasing

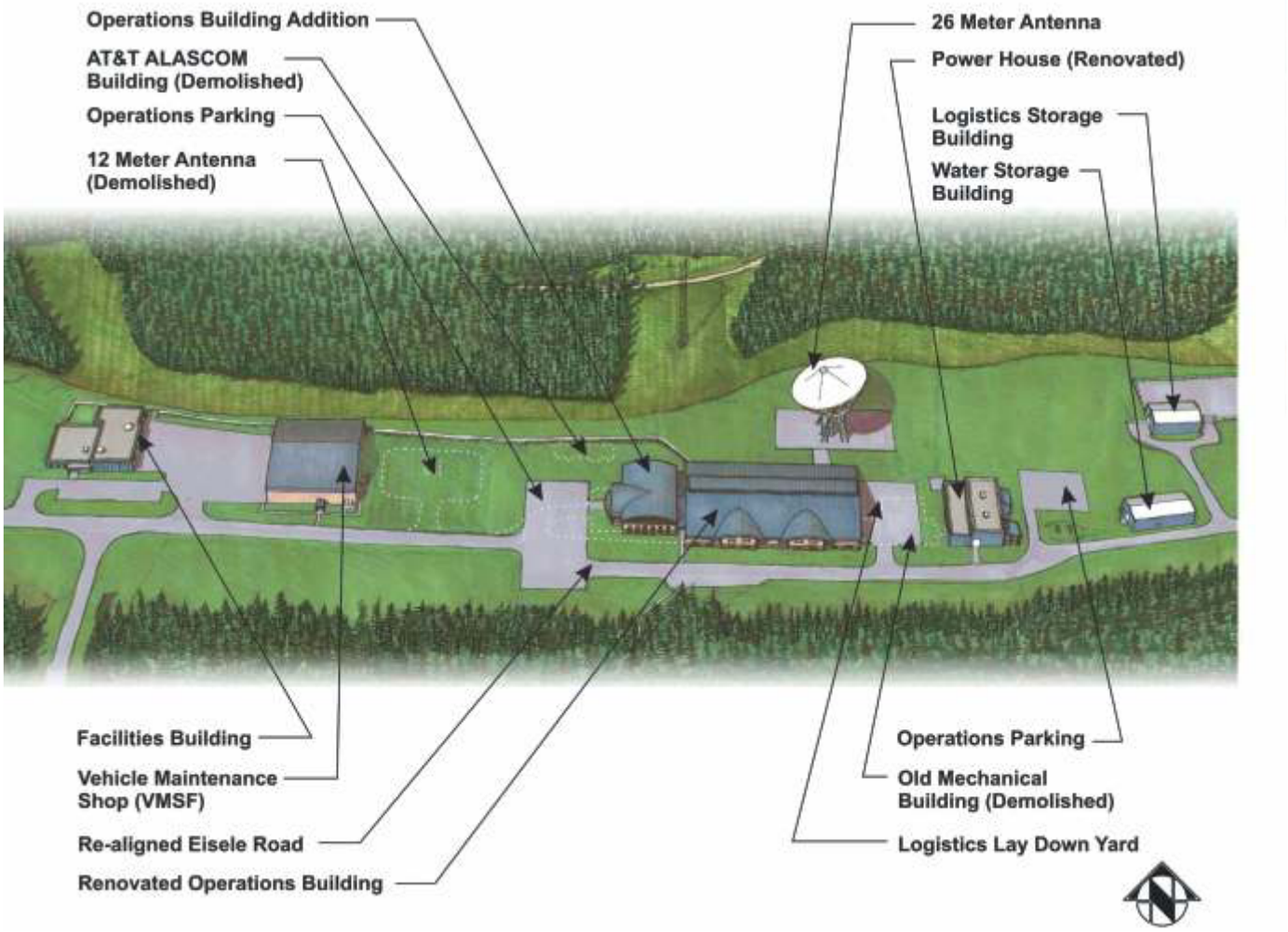
Fairbanks CDAS Capital Improvement Program

Phase	ID	Project Description
0	1	Operations Building - Emergency Roof Stabilization
0	--	Vehicle Maintenance Shop
0	--	Antenna Demolition 9&12-m
0	--	Water Storage Bldg Repairs
0	--	Logistics Facility
1	--	Transmitter Shelter Demo
1	--	Boom Truck Garage Rehab
1	--	R&R Rate Bldg Renovation
1	--	GCGO Building Renovation
1	--	Facilities Building
1	2	Ops Bldg Revitalization - Reroute Access
1	3	Ops Bldg Revitalization - Relocate Parking
2	4	Ops Bldg Revitalization - Relocate AT&T Antenna
2	5	Ops Bldg Revitalization - Contractor Staging Area
2	6	Ops Bldg Revitalization - Site Preparation for Pre-Engineered/Power House Foundations
2	7	Ops Bldg Revitalization - Relocate Transformers and Transformer Pads
2	8	Ops Bldg Revitalization - Reroute Infrastructure
2	9	Ops Bldg Revitalization - Install Boiler/Chiller in Power House
3	10	Ops Bldg Revitalization - Install Pre-Engineered Building Foundations/Shell
3	11	Ops Bldg Revitalization - Site Preparation for Addition
3	12	Ops Bldg Revitalization - Mechanical Spaces/Building Shell
3	13	Ops Bldg Revitalization - Operations Building Addition
4	14	Ops Bldg Revitalization - Realign Drive (Eisele Road) to Minimum Standoff Distance
4	15	Ops Bldg Revitalization - West Parking Area/Laydown Yard
4	16	Ops Bldg Revitalization - Reopen Eisele Road
4	17	Ops Bldg Revitalization - Tenant Improvements
4	18	Ops Bldg Revitalization - Demolish AT&T Building

Fairbanks CDAS



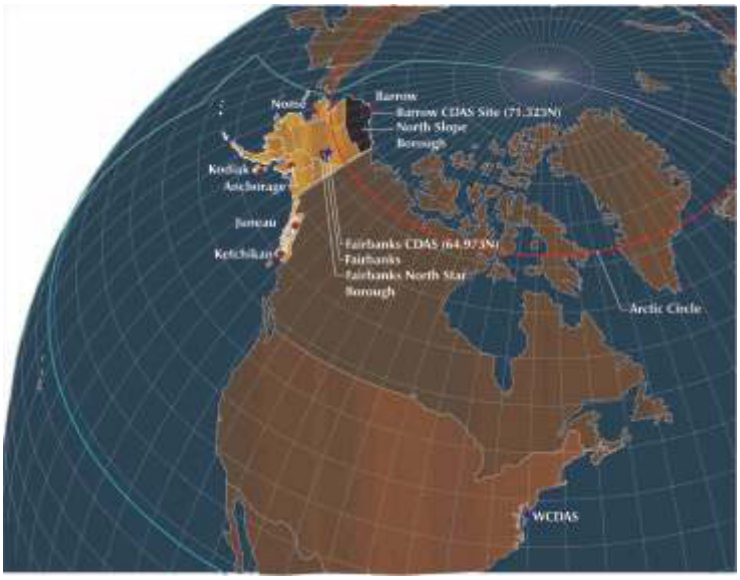




Facilities Master Plan

Barrow CDAS

Note: as of this writing, the Arctic Satellite Antenna Project (ASAP) at Barrow has been placed on hold.



High-Latitude Site at Barrow

The NESDIS OSD Ground Systems Division has identified the need to extend and improve the capabilities of existing ground systems infrastructure by extending operations to a high-latitude site, vastly improving the ability of the Fairbanks CDAS to access orbital passes from existing and planned polar-orbiting satellite constellations. The high-latitude site will support the National Polar-orbiting Operational Environmental Satellite System (NPOESS) convergence program (successor to the Polar-orbiting Operational Environmental Satellite (POES) and Defense Meteorological Satellite Program (DMSP) programs), geostationary orbiting Environmental Satellite (GOES)-West, European Organization for thee Exploitation of Meteorological Satellites (EUMETSAT) meteorological operations (METOP) under the Initial Joint Polar Satellite (IJPS) program, and NASA satellites -- EOS Aura, EOS Aqua, and Coriolis.

Proof of Concept POES System

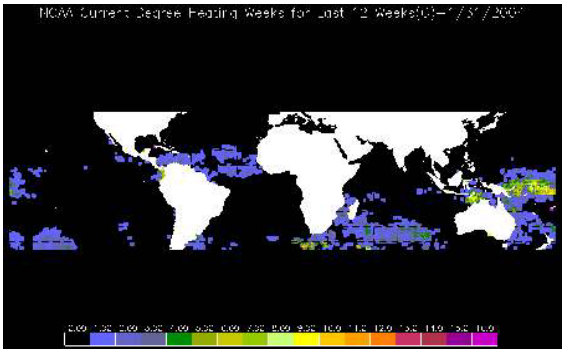
In 2001, a proof of concept POES system (3m SeaSpace antenna) earth station was installed at Barrow. The 2001 project is the leading edge of a long-range plan to improve the NOAA/NESDIS polar satellite ground systems command and data downlink capabilities for polar-orbiting satellites. The follow-on Arctic Satellite Antenna Project (ASAP) is intended to bring full capabilities to the selected Barrow site. A 4-meter command uplink antenna is also online at the current Barrow site.

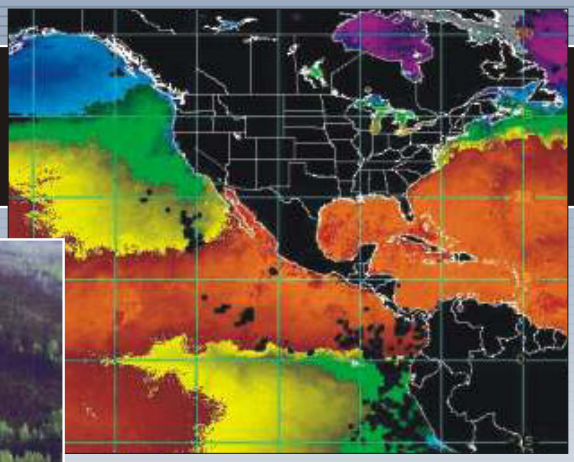
Command Uplink at Barrow

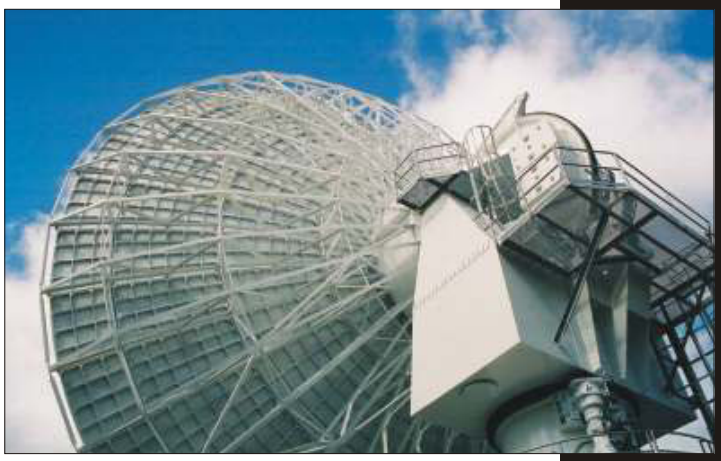
After careful analysis, the Barrow Airport/Industrial site was selected for further site-specific master planning. The airport site meets all requirements and is the best site for the ASAP project. The Airport/Industrial site, owned by the Ukpeagvik Inupiat Corporation (UIC), is located about two miles southwest of the Wiley Post-Will Rogers Memorial Airport. This property is large enough to allow installation of the required two 13-meter antennas oriented northeast-southwest with the required 2,000 feet of separation. The site plan includes a multiple-antenna capability plus an operations building.

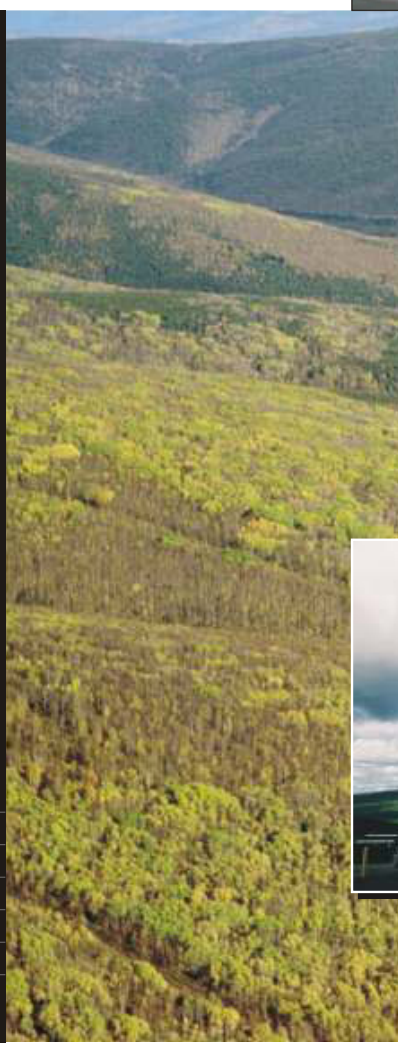
Fairbanks CDAS

Design Treatments


NOAA Current Degree Heating Weeks for Last 12 Weeks(07-17-2007





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